3. DATA QUALITY OBJECTIVES

To help with defensible decision-making, the EPA has developed the data quality objective (DQO) process, which is a systematic planning tool, based on the scientific method, for establishing criteria for data quality and for developing data collection designs (EPA 1994). DQOs have been developed to guide monitoring and sampling at the ICDF Complex. The process consists of seven iterative steps that yield a set of principal study questions and decision statements that must be answered to address a primary problem statement. The seven steps comprising the DQO process are listed below:

Step 1: State the problem

Step 2: Identify the decision

Step 3: Identify the inputs to the decision

Step 4: Define the study boundaries

Step 5: Develop decision rules

Step 6: Specify limits on the decision

Step 7: Optimize the design for obtaining data.

The DQOs that govern the ICDF Complex groundwater sampling and monitoring are presented in the following sections. These objectives were negotiated with, and have the concurrence of, the Agencies. Additional information on the evaluation of data will be provided in the ICDF Complex RAWP.

3.1 State the Problem

In order to comply with ICDF Complex ARARs and WAG 3 RAOs, groundwater detection monitoring is required at the location of the new ICDF Complex. The ARARs require a detection monitoring program to determine if a release has occurred from the ICDF landfills or evaporation pond into the uppermost aquifer or perched water that would result in an exceedance of the ICDF Complex RAOs for groundwater. ICDF Complex RAOs require the DOE to prevent the release of leachate to underlying groundwater that would result in exceeding a cumulative carcinogenic risk of 1×10^{-4}, a total noncarcinogenic health index of 1, or applicable state and federal groundwater quality standards in the SRPA.

3.2 Identify the Decision

3.2.1 Principal Study Questions

The fundamental question to be addressed is

> Has operation of the ICDF landfill or evaporation pond resulted in the release of contaminants into the environment beneath the landfill that could exceed a cumulative carcinogenic risk of 1×10^{-4}, a total noncarcinogenic health index of 1, or applicable state and federal groundwater quality standards in the SRPA?

In order to answer this, the following questions will be studied:

- Is there evidence of leachate from the ICDF landfill or evaporation pond secondary monitoring system that could result in exceeding the RAOs in the SRPA?
- Are the downgradient SRPA wells significantly above pre-existing contamination levels in the SRPA as a result of ICDF Complex operations?
- Do increases in perched water concentrations indicate a release from the ICDF Complex, or are they from another source or due to decreased water levels?
- Do increases in perched water concentrations indicate a potential for exceeding the RAOs in the SRPA?

3.2.2 Alternative Actions

The alternative actions associated with this monitoring program include determining that a significant release of contaminants has not occurred to the environment beneath the ICDF Complex or determining that a significant release has occurred and that corrective actions are required. A significant release means a release that could result in exceeding the RAOs in the SRPA. If any perched water or SRPA monitoring wells show unexpected results above baseline conditions, the well(s) will be resampled. If resampling confirms the unexpected result(s), all lines of evidence, such as decreased perched water levels, ICDF Complex leachate concentrations, artifacts of sampling or analysis, and Groups 4 and 5 data, will be considered in determining whether the ICDF Complex has leaked.

If the unexpected concentrations are due to a release from ICDF, the substantive requirements of 40 CFR 264.99 will be addressed. If the unexpected concentrations are due to a source other than the ICDF Complex or are due to decreased water levels in the perched water, detection monitoring will continue and the substantive requirements of 40 CFR 264.98(g)(6) will be addressed. The general methods that will be used to analyze the sample results will be outlined in the ICDF Complex RAWP. If a statistically significant evidence of a release is detected in any downgradient SRPA groundwater monitoring well, then resampling will occur to confirm the results. If the resampling and lines of evidence confirm that a significant release has occurred, then corrective measures will be implemented.

3.2.3 Consequences of Incorrect Alternative Actions

The analysis of data collected under this groundwater monitoring plan is complicated, because pre-existing contamination from other sources is present. Perched water contamination exists in the vicinity of the ICDF Complex from the percolation ponds and potentially from other sources, and concentrations will likely increase as perched water levels decline. The ICDF Complex is located downgradient from the former INTEC injection well, and known contaminant plumes exist in the SRPA under the ICDF Complex. Therefore, there are many reasons why statistically significant increases in concentrations that would be unrelated to ICDF Complex operations could occur in detection monitoring wells. The two most likely scenarios are increased concentrations in perched water wells due to decreased water levels or a slug of contamination moving downgradient in the SRPA from the former injection well that has not passed the ICDF Complex yet. Because the perched water data are not suited to standard statistical analysis techniques, a plan for evaluation of data will be prepared once a baseline data set is collected and analyzed.

The consequences of incorrectly concluding that the ICDF landfill or evaporation pond has leaked are severe. If remedial actions are taken on a sound landfill or evaporation pond, unnecessary expenses will be incurred to further investigate or attempt to remedy the problem and would include disposal delays that could impact other projects. The consequences of incorrectly concluding that there has not been a significant release to the environment from the ICDF Complex could result in further contamination of the perched water and, if the contamination were to reach the SRPA, added contamination of the SRPA and exceedance of the RAOs. Because the consequences of this are severe, the ICDF Complex and this monitoring plan are being designed with multiple safety factors and monitoring points to make the likelihood of this happening extremely low. The design includes multiple layers in the cap, liners, leachate collection and detection systems, perched water monitoring points, and SRPA wells. In addition, multiple conservative assumptions have been used in all modeling efforts to predict ICDF Complex performance over time and set protective WAC and operating requirements.

3.2.4 Decision Statements

Detection monitoring data from the perched water and SRPA will be used along with lines of evidence to determine whether ICDF Complex waste disposal operations have resulted in a significant release of contaminants to the environment beneath the ICDF landfill or evaporation pond that would exceed RAOs in the SRPA. Should a significant release be identified through this monitoring program, corrective measures will be evaluated and implemented.

3.3 Identify Inputs to the Decision

The following information will be used to determine whether there is evidence that ICDF Complex operations have resulted in a release to the environment:

1. Collection and analysis of water samples from the unconsolidated sediments beneath the compacted clay layer (lowermost layer) of the ICDF landfill (tertiary leak detection system).

2. Measurement of groundwater elevations in the vicinity of the ICDF Complex to determine the hydraulic gradient of the SRPA beneath the ICDF Complex.

3. Analysis of groundwater samples from the SRPA beneath the ICDF Complex, from monitoring wells upgradient of the ICDF landfill that represent background water quality, from downgradient of the ICDF landfill, and representing water quality passing the point of compliance.

4. Analysis of the SRPA sampling results for each indicator parameter comparing upgradient monitoring point concentrations to concentrations at downgradient monitoring wells to identify statistically significant evidence of elevated concentrations from the ICDF Complex landfill in the SRPA. Note: This evaluation will be performed in conjunction with the OU 3-13 Group 5 monitoring program and may include evaluation of other contaminant and data sources.

5. Analysis of samples from the ICDF landfill leachate collection system sump and tertiary system and comparison to initial concentrations. Analytes found in the perched water and/or SRPA will be compared to those found in the landfill leachate. These data will also be used for periodic updates to the indicator compound analyte list.

6. Measurement of perched water levels to determine if they have changed.

7. Evaluation of OU 3-13 Group 4 monitoring data to determine if unusual perched water data at the ICDF Complex are a result of other sources.

8. Techniques to evaluate ICDF Complex perched water and SRPA data that will be outlined in the ICDF Complex RAWP.

9. Analytical detection limits, which are discussed in Section 4.3.

10. Precision, accuracy, representativeness, comparability, and completeness, which are discussed in Section 7.1.

3.4 Define the Study Boundaries

This groundwater monitoring plan includes the drilling and installation of six new perched water wells and five new SRPA wells. It also includes plans to monitor both the primary and tertiary monitoring systems, the perched water, and the SRPA. The SRPA monitoring beneath the ICDF Complex will be conducted at points both upgradient and downgradient of the ICDF Complex boundary. As established in the ICDF Complex ARARs, the ICDF Complex groundwater monitoring program is required to monitor the uppermost aquifer upgradient of the ICDF Complex to determine the background concentrations of hazardous constituents in groundwater. The groundwater monitoring program is also required to collect groundwater samples representative of the quality of groundwater passing the point of compliance in the SRPA downgradient of the ICDF Complex.

Six new perched water wells will be installed with up to three completions in each borehole. These wells are expected to yield limited, if any, water and go dry over time. They will not be drilled deeper or replaced if they go dry. If, however, the well's integrity is compromised prior to going dry, the well will be fixed or replaced.

The groundwater monitoring program will continue throughout the active life of the ICDF Complex and through the ICDF Complex closure period. The active life of the ICDF Complex is estimated to continue for 15 years from 2003 through 2018. The closure period for the ICDF Complex is estimated to continue 30 years past discontinuation of waste disposal at the ICDF Complex (through 2048). Monitoring of the ICDF landfill following the closure period will be conducted in coordination with the long-term monitoring of the broader INTEC facility and ROD requirements to ensure that RAOs are maintained in the SRPA beyond the year 2095.

3.5 Develop a Decision Rule

Under the regulatory requirements described in Section 1.2, this plan implements a detection monitoring program for the ICDF Complex with the compliance point in the SRPA downgradient of the facility. Perched water data will be evaluated to determine whether the perched zones are continuous under the ICDF Complex, whether they are in the same layer or are hydraulically connected, and whether an upgradient and downgradient well can be determined in each zone.

If detection monitoring indicates unexpected concentrations, then the well(s) will be resampled. If the second sample does not confirm the first sample, a third sample will be taken to confirm the second sample. If resampling confirms the unexpected result, then a determination will be made under 40 CFR 264.97(g)(6) using lines of evidence, whether the source is from the ICDF landfill or evaporation pond or another source. If the source is the ICDF Complex, then the substantive requirements of 40 CFR 264.99 will be met or corrective action initiated.

If it is determined through monitoring and lines of evidence that a release has occurred from the ICDF Complex, compliance monitoring will be implemented as set forth in Section 1.2. If sampling results or lines of evidence, such as contamination in the tertiary leak detection system sump, indicate a significant release, corrective actions will be evaluated and implemented as necessary.

3.6 Specify the Tolerable Limits on Decision Errors

Evaluation of the ICDF Complex SRPA monitoring data will be performed as described in 40 CFR 264.97. Several methods of statistical analysis are allowed, with selection of an appropriate method based on the distribution of chemical data obtained by the sampling program. Monitoring for contaminants in the perched water may not be amenable to the standard method of statistical comparison of a downgradient well to the representative upgradient well, typical of a standard RCRA groundwater monitoring program. In addition, the data may not be amenable to standard statistical analysis techniques if the concentrations significantly increase due to declining water levels. Due to the unique problems posed by perched water monitoring, a data evaluation plan that meets the substantive requirements of 40 CFR 264.97(h)(6) will be presented once sufficient data are collected and analyzed.

Although not part of RCRA detection monitoring for groundwater, useful information can be obtained from the leachate sump. Contaminants in the sump beneath the ICDF landfill will first be sampled following construction of the landfill and prior to initial disposal of waste into the landfill. (Dewatering of the clay liner is predicted to occur as a result of compaction and may cause moisture migration into the tertiary monitoring system.) If water in the sump is not available prior to landfill operation, it will be monitored on a periodic basis, and leachate quality trends will be established.

3.7 Optimize the Design

The DOE, the EPA, and the IDEQ have agreed to the design of the detection monitoring system. It complies with the applicable substantive groundwater monitoring requirements of RCRA, 40 CFR 264, Subpart F. This detection monitoring program requires four baseline samples from the SRPA wells prior to operation of the landfill.

Six SRPA wells will be monitored in the vicinity of the ICDF Complex, including one existing upgradient monitoring well and five new monitoring wells to be installed south of the ICDF Complex (Figure 3-1). The existing monitoring well to be used for the ICDF Complex monitoring is USGS-123 located north of the ICDF Complex and between the ICDF Complex and the former INTEC injection well. Five new SRPA monitoring wells will be constructed along the southern boundary of the ICDF Complex and are identified as wells SRPA-1 through -5 in Figure 3-1. The new monitoring wells will be installed downgradient of the ICDF Complex. If the drill rig is shut down overnight, water levels will be measured through the casing before drilling resumes. Once the drilling has penetrated the uppermost permeable zone of the aquifer and total depth is reached, geophysical logs will be run to determine optimum well completion. Typical borehole logging will consist of natural gamma, neutron, caliper, and video logs. If hole stability is an issue, it may not be possible to conduct a full suite of geophysical logs and this will be documented.

The wells will be constructed to monitor the uppermost permeable 40 ft of the SRPA at each well location. A conceptual design for the new SRPA monitoring wells is provided in Figure 3-2. The wells will be constructed of carbon-steel surface casing and 6-in.-diameter stainless steel casing with a 40-ft-long gravel-packed well screen. If necessary for hole stability, additional carbon-steel casing may be used. The well screen will be installed to ensure proper placement of the gravel pack around the screen.

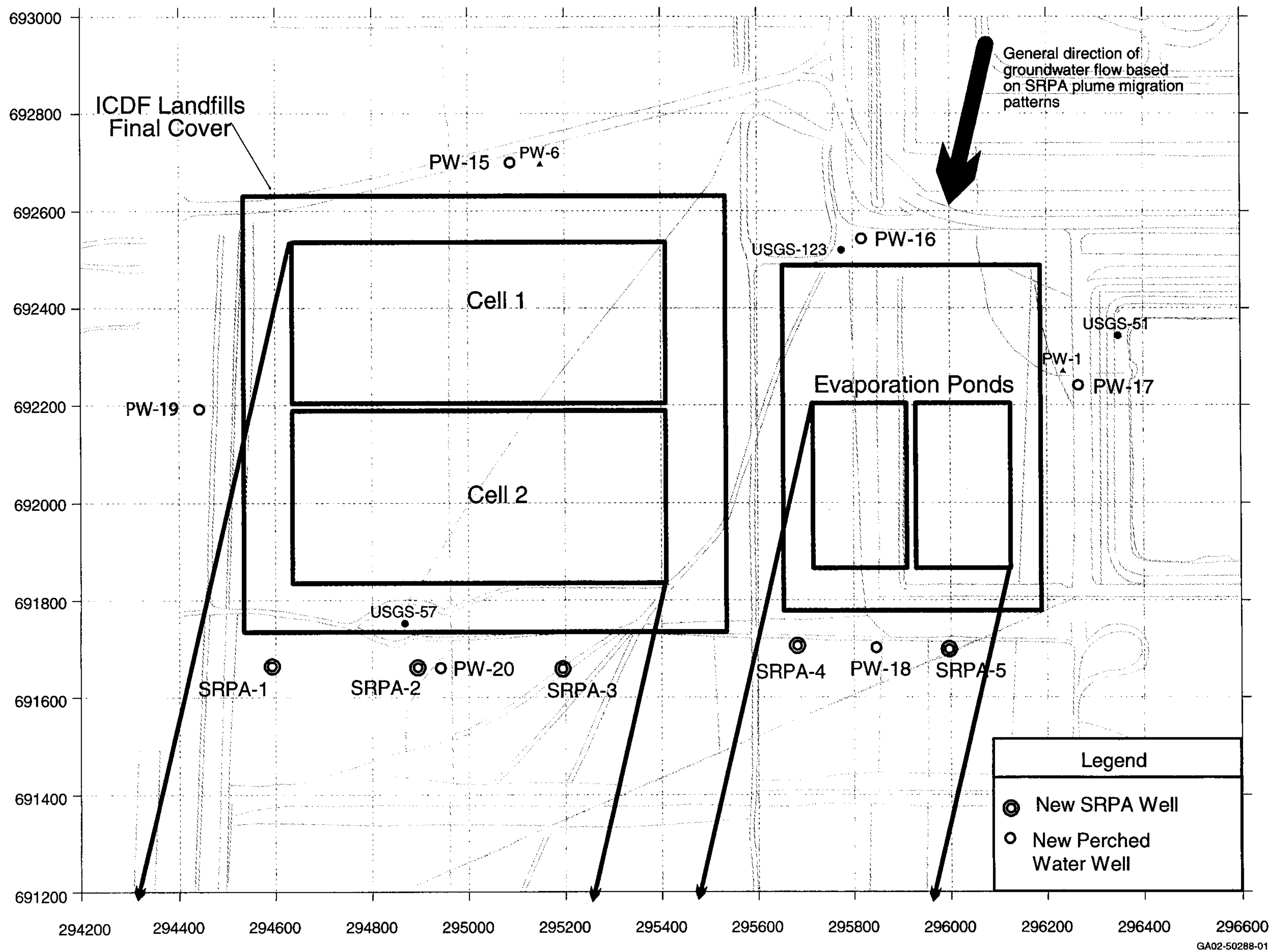

Figure 3-1. Detection monitoring network.

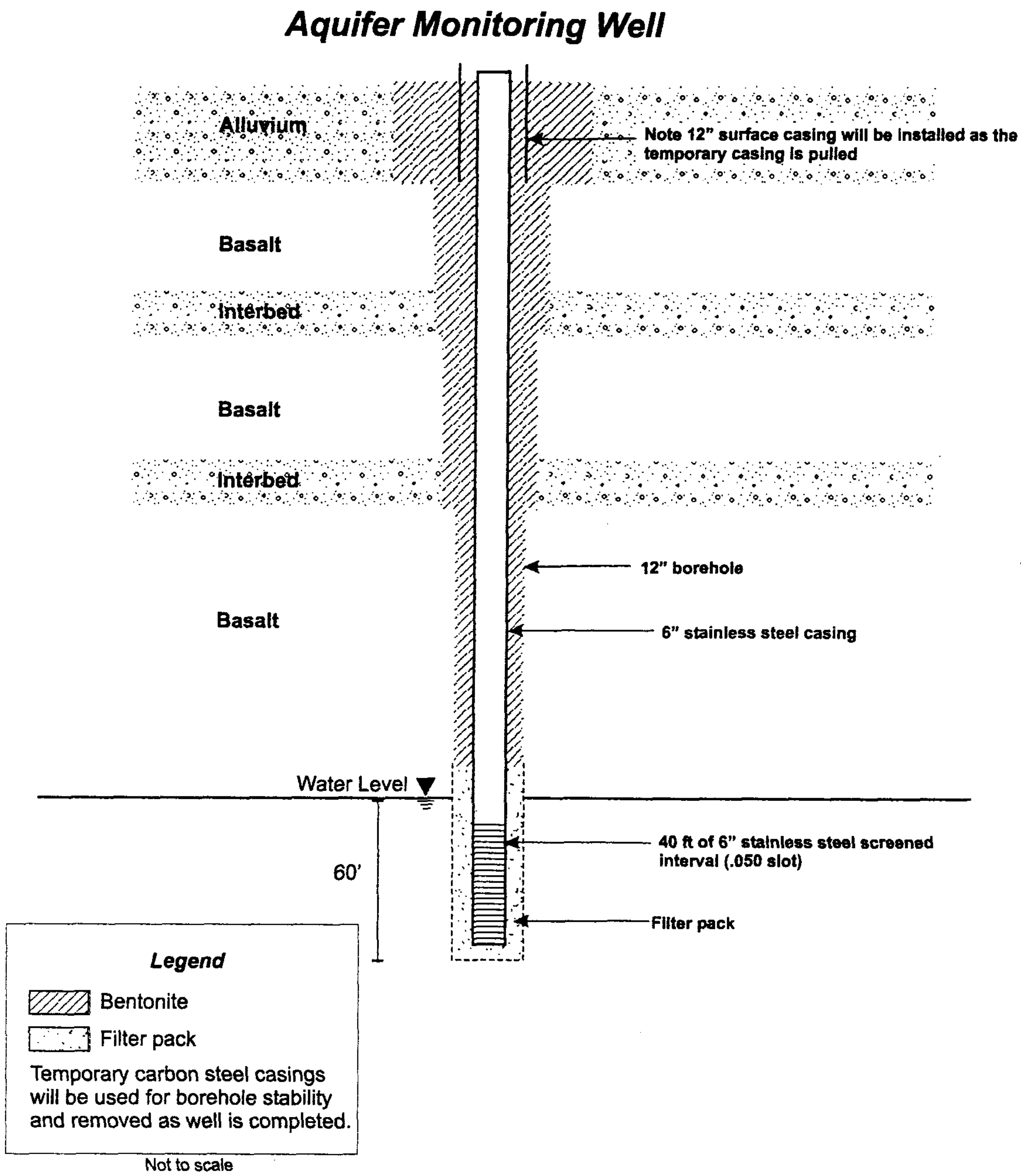

Figure 3-2. Conceptual design for the ICDF Complex SRPA detection monitoring wells.

The annular space between the stainless-steel casing and borehole will be sealed using either bentonite or neat cement. The wells will be fully developed to restore the groundwater properties disturbed during the drilling process and improve the hydraulic characteristics of the saturated zone.

A variable-speed electric submersible pump will be installed in each SRPA well, allowing for both conventional well purging and low-flow purging and sampling. The pump will be set on inert materials such as stainless steel piping or Teflon-coated plastic tubing. The use of low-flow purging and sampling technology will minimize waste generated during sampling.

Six new perched water wells (PW-15 through PW-20) will be installed at the locations shown in Figure 3-1. Wells will be drilled to approximately 400 ft and geophysically logged to determine optimum well completions. Typical borehole logging will consist of natural gamma, neutron, caliper, and video logs. If hole stability is an issue, it may not be possible to conduct a full suite of geophysical logs and this will be documented. The wells will be completed with a maximum of three completions. These completions will target the three zones with the most extensive saturated sections or the highest moisture. A conceptual design for the new perched water wells is provided in Figure 3-3. Carbon-steel casing may be used for hole stability. The wells will be constructed of 2-in.-diameter polyvinyl chloride (PVC) casing with a 20-ft well screen. The well screen will be installed to ensure placement of sand pack around the screen. The annular space between the PVC casing and the borehole will be sealed using either bentonite or neat cement. If only one or two saturated zones are encountered, the wells will be completed only in the saturated zones. If no saturated zones are encountered, the field hydrogeologist will use his or her best judgment to determine the three completion intervals that are most likely to encounter water in the future from a potential source. Lithologies and saturated zones will be compared between boreholes during drilling to aid in the selection of completion intervals. To monitor for possible influence of the Big Lost River located over 3,100 ft north of the ICDF Complex, well PW-15 will have two completions (PW-6 is the upper well) and PW-19 will have three completions. Transducers will be installed in PW-15 and PW-19 when the Big Lost River begins flowing. If the wells become saturated, they will be monitored until drain-out.

Water levels will be measured and the selected SRPA and perched water monitoring wells will be sampled to meet the requirements discussed in Section 1.2. This will include an initial baseline sampling of four independent samples. Following the baseline sampling, semiannual monitoring will be performed for the duration of the monitoring program unless sampling results indicate the need for corrective actions (as described in Section 1.2.3). In addition, samples will be collected once every 2-1/2 years and analyzed for a more extensive analyte list. The SRPA sampling schedule and analytes are summarized in Table 3-1. The analyte lists and sampling frequencies can be changed by agreement between the three Agencies based on evaluation of data and technical justifications. Water levels will be measured in the monitoring wells during each sampling event. Data from existing wells will be used to aid in understanding pre-existing contamination.

In addition to detection monitoring in the SRPA and perched water, this plan includes leachate monitoring. The reasons for this are as follows:

1. It is important to be able to detect a release from the ICDF landfill at the earliest point. Leachate monitoring serves this purpose and provides an indication of the types of contaminants in the leachate.

2. The evaluation of perched water data is not expected to be amenable to standard statistical methods because sharp increases in concentration may occur as the perched water dries up. Leachate monitoring will define the leachate contaminants and can be used as a line of evidence to support determination of whether increased concentrations are the result of a release from the ICDF landfill or evaporation pond or another source.

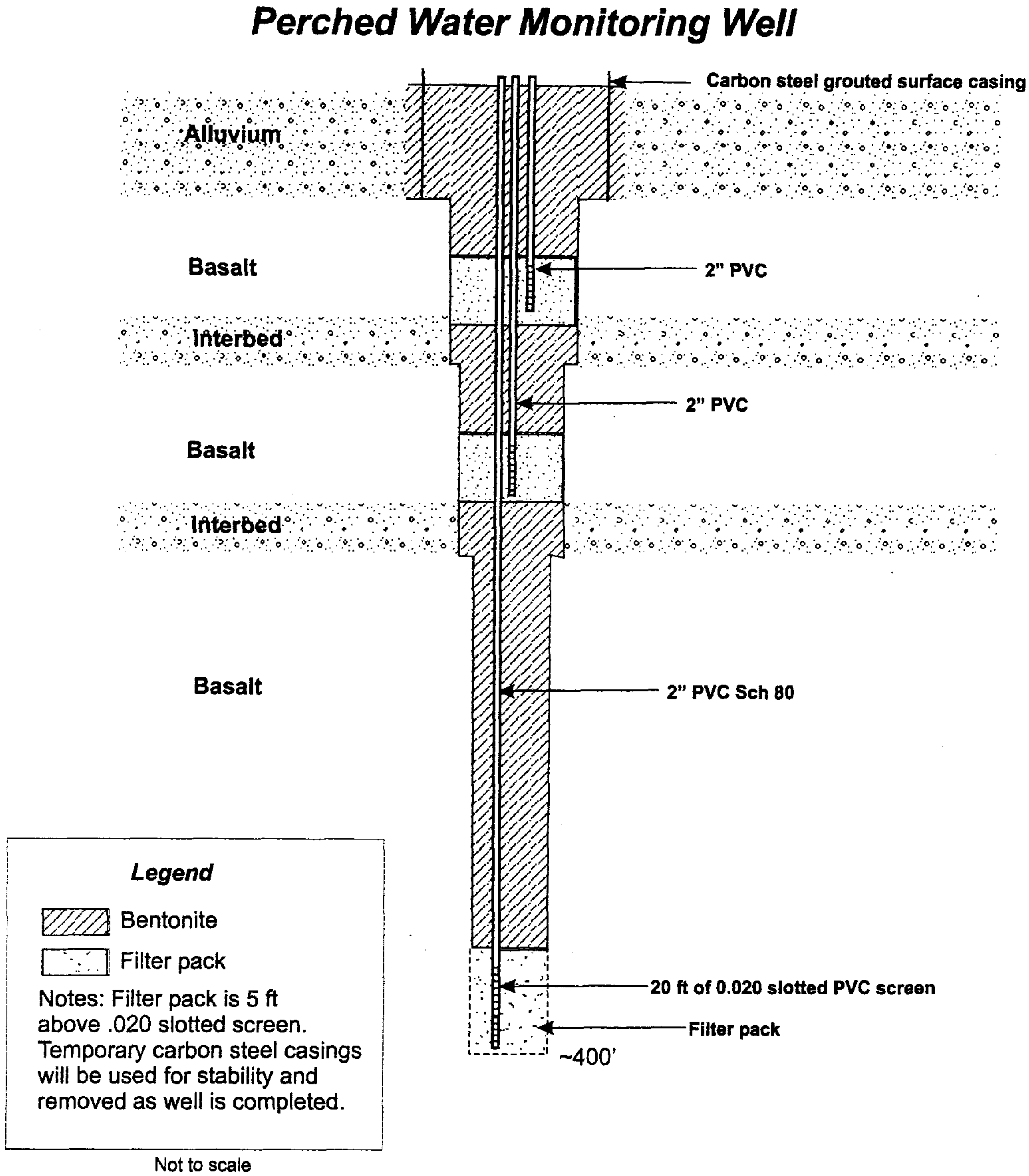

Figure 3-3. Conceptual design for the ICDF Complex perched water monitoring wells.

Table 3-1. Sampling schedule and analyte list for detection monitoring in the SRPA and perched water.

Sampling Period	Sampling Frequency	Analytes
Baseline	Four independent samples	Field parameters (pH, specific conductance, and temperature) Appendix IX volatile and semivolatile organic compounds (VOCs and SVOCs) Radionuclides (H-3, I-129, Tc-99, Sr-90, Pu [-238, -239/240], U [-234, -235, -238], gamma spectroscopy) Appendix IX metals, filtered and unfiltered Major cations and anions (calcium, potassium, magnesium, sodium, nitrate, sulfate, bicarbonate, chloride)
Years one and beyond of ICDF Complex operations	Semiannual	Field parameters (as above) Mercury and total chromium, field filtered Radionuclides (Sr-90 and Tc-99) Appendix IX VOCs
Years one and beyond of ICDF Complex operations	Every 2.5 years	In addition to the parameters above for semiannual: Appendix IX SVOCs Radionuclides (I-129, Pu [-238, -239/-240], U [-234, -235, -238]) Major cations and anions (as above)

An evaluation of vadose zone monitoring techniques suitable for monitoring beneath the ICDF landfill was conducted to identify an optimum approach, given the objective for identifying the release of contaminants to the environment. The overriding technical advantage of installing a liner system for the collection of potential leachate releases from the ICDF landfill is the areal extent that the liner system is capable of integrating for sample collection. Using a liner system, the effective areal extent of sampling is dramatically increased. For this reason, an additional liner system for the interception and collection of leachate releases from the ICDF landfill is planned. The additional liner system, or tertiary leak detection system, will be installed below the bottom compacted clay layer of the landfill. Figures 3-4 and 3-5 show the location and design of the tertiary leak detection system.

Because sampling of the leachate collection system and tertiary leak detection system cannot be performed prior to construction of the ICDF landfill, sampling of these locations will begin in the first year of operation of the ICDF Complex. Samples of the tertiary leak detection system sump and leachate collection system sump will be analyzed for the constituents listed in Table 3-2.

Table 3-2. Sampling schedule and analyte list for leachate collection and tertiary leak detection systems.

Sampling Location	Sampling Frequency	Analytes
Leachate collection system sump	First sample whenever sufficient volume exists	Same as for baseline on Table 3-1
	Annual, or whenever sufficient volume exists	Same as for semiannual on Table 3-1
	Once every 2.5 years, or whenever sufficient volume exists	Same as for once every 2.5 years on Table 3-1
Tertiary leak detection system sump	Semiannual	Specific conductivity

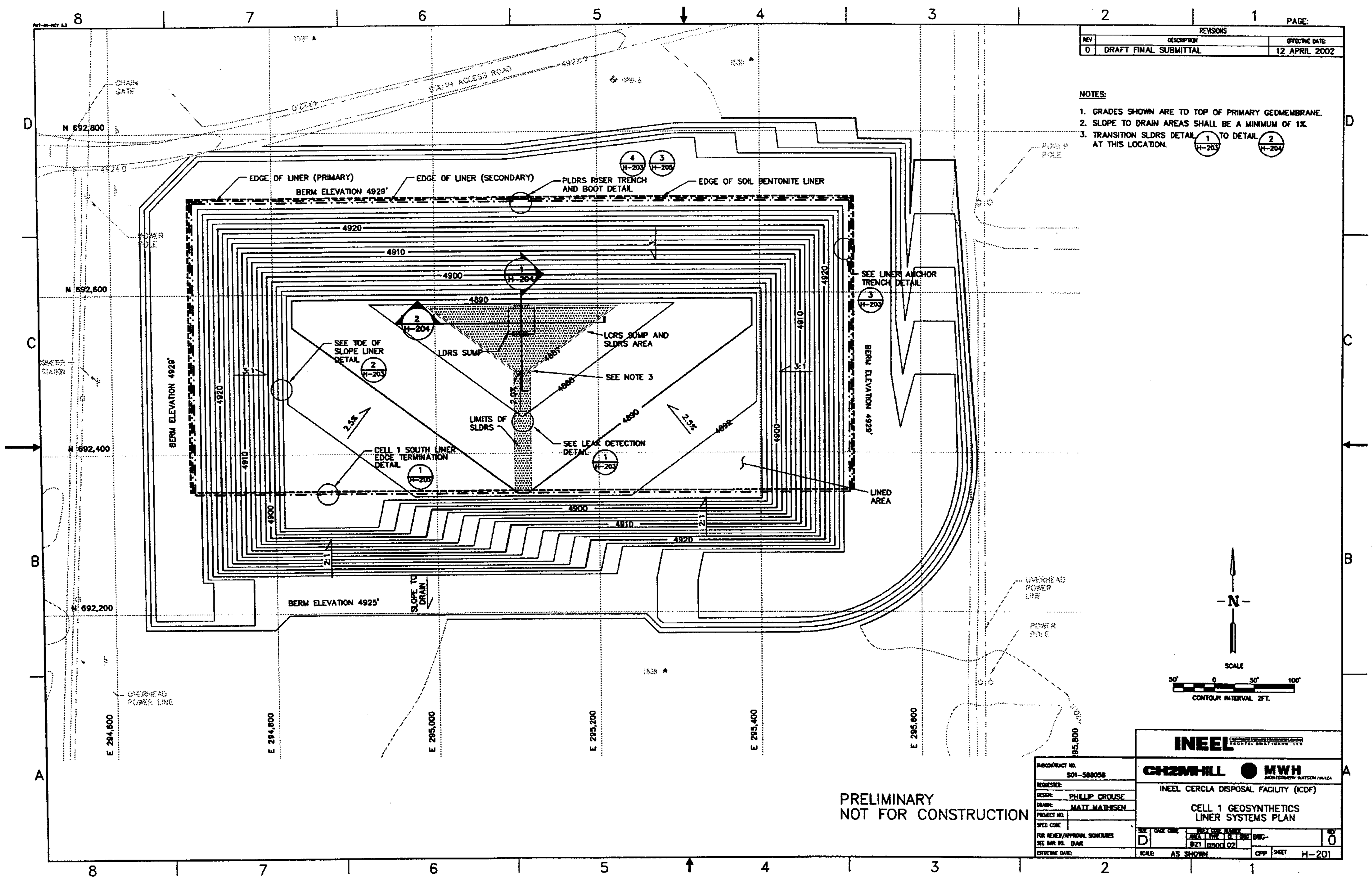

Figure 3-4. Location of the tertiary leak detection system, which is the shaded area labeled as the secondary leachate detection and removal system (SLDRS).

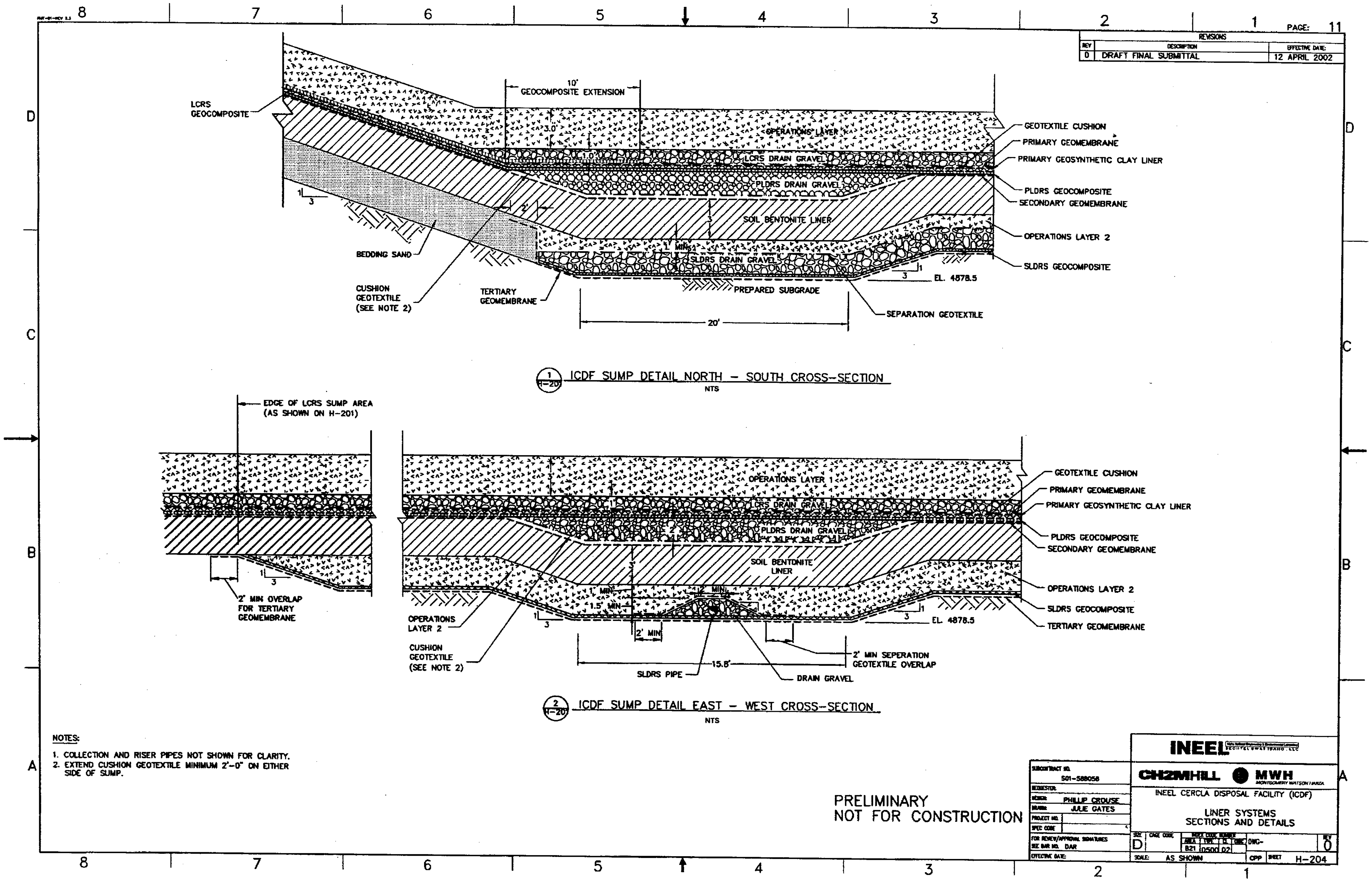

Figure 3-5. Design of the tertiary leak detection system (tertiary geomembrane, SLDRS pipe, drain gravel, and the SLDRS geocomposite).

4. MONITORING ACTIVITIES

The following sections describe the field activities and data collection to be used to meet the DQOs described in Section 3.

4.1 Sampling and Monitoring Locations

4.1.1 Tertiary Monitoring System, Perched Water, and Uppermost Aquifer Sampling Locations

Tables 4-1 through 4-3 list the monitoring locations to be used for the ICDF Complex groundwater monitoring program. These sampling locations are also shown in Figures 3-1, 3-4, and 3-5.

Table 4-1. Locations of ICDF Complex SRPA detection monitoring wells.

Location Name	Rationale for Well Location and Screen Interval
USGS-123	Upgradient well
SRPA-1	Downgradient of ICDF landfill, uppermost permeable 40 ft of SRPA
SRPA-2	Downgradient of ICDF landfill, uppermost permeable 40 ft of SRPA
SRPA-3	Downgradient of ICDF landfill, uppermost permeable 40 ft of SRPA
SRPA-4	Downgradient of ICDF evaporation pond, uppermost permeable 40 ft of SRPA
SRPA-5	Downgradient of ICDF evaporation pond, uppermost permeable 40 ft of SRPA

Table 4-2. New perched water detection monitoring wells.

Perched Water Well	Maximum Completions	Rationale for Well Location
PW-15	(Shallow: PW-6) Medium Deep	Monitor for possible flows from Big Lost River, influence from percolation ponds and drain-out, and possible residual from percolation ponds.
PW-16	Shallow Medium Deep	Monitor for potential influence from INTEC facility and percolation ponds and drain-out. Well is likely "upgradient" from the ICDF landfill and evaporation pond if there is a perched water source from INTEC facility.
PW-17	(Shallow: PW-1) Medium Deep	Monitor influence of percolation ponds and drain-out. Well is likely "upgradient" from the ICDF landfill and evaporation pond and "downgradient" of the percolation ponds. Well is close to ICDF evaporation ponds to detect potential releases.

Table 4-2. (continued)

Perched Water Well	Maximum Completions	Rationale for Well Location
PW-18	Shallow Medium Deep	Close to ICDF evaporation ponds to detect potential releases. Monitor influence of percolation ponds and drain-out.
PW-19	Shallow Medium Deep	Monitor for possible intermittent flows from Big Lost River. Determine if percolation pond influence extends west of the ICDF landfill.
PW-20	Shallow Medium Deep	Determine if perched water extends south of the ICDF landfill.

Table 4-3. Supplemental tertiary system monitoring locations.

Location Name	Location and Justification
Leachate collection system sump	Within ICDF landfill waste above the primary layer
Tertiary leak detection system sump	Beneath compacted clay layer of ICDF landfill containment system

4.1.2 Water Level Monitoring Locations

Water levels will be collected from all well monitoring locations listed in Tables 4-1 through 4-3. Borehole deviation surveys will be conducted on all new monitoring wells and on well USGS-123.

4.2 Schedule

The schedule for ICDF Complex groundwater and leachate monitoring is described in Tables 3-1 and 3-2.

4.3 Data Types

4.3.1 Analytical Methods

Monitoring samples will be analyzed for the list as outlined in Table 4-4. The analytes were based on an analysis of WAG 3 COCs, evaluation of the ICDF design inventory of wastes to be disposed of (EDF-ER-264), predictive modeling of leachate generation, and K_ds. The list of analytes will be reviewed when validated results are received from sampling of the leachate collection system.

Table 4-4. ICDF Complex sampling analytes, methods, and detection limits.

Analyte	Analytical Method[a]	Detection Limits (pCi/L)
Tritium	LSC	400
Technetium-99	LSC or GFP	10
Iodine-129	LSS, LEPS, or GFP	0.1 (baseline sampling) to 1[b]
Strontium-90	GFP	1
Plutonium isotopes (Pu-238 and -239/240)	ALS	0.2
Uranium isotopes (U-234, -235, and –238)	ALS	0.2
Gamma spectroscopy	GMS	30
Appendix IX volatile organics	SW846 8260B	Varies by analyte
Appendix IX semivolatile organics	SW846 8270C	Varies by analyte
Appendix IX metals	SW846 methods 6010B, 7000A, 7062, 7471A, and 7742	Varies by analyte
Major cations	SW846	Varies by analyte
Sulfate	SW846 method 9035, 9036, or 9038	Varies by analyte
Bicarbonate	Std M Part 2320-B	Varies by analyte
Chloride	EPA Method 325.1, 325.2, or 325.3	Varies by analyte
Nitrate	EPA Method 353.2 (Rev. 0), ASTM Std D3876.90 (Method A or B), or Std M Part 4500-NO3 (Method D, E, or F)	Varies by analyte

a. Methods used for radionuclide analysis are laboratory-specific. The laboratory shall use standard operating procedures based on standard analytical methods provided to the INEEL Sample Management Office. The references that may be used to develop the laboratory standard operating procedures are in Wells (1995).

ALS = Alpha spectrometry
GFP = Gas flow proportional
GMS = Gamma screen
LEPS = Low energy photon spectrometry
LSS = Liquid scintillation spectrometry

b. Detection limit will depend on availability of water.

4.3.2 Field Quality Control

For groundwater monitoring and sampling, collection of quality control (QC) samples is required. Field quality requirements will be satisfied by collecting QC samples (duplicates, field blanks, trip blanks, equipment rinsates, and performance evaluation) during the groundwater sampling according to the schedule presented in Table 4-5.

Table 4-5. The quality assurance/quality control (QA/QC) samples for groundwater sampling.

Activity	Type	Comment
Groundwater sampling	Duplicate	Field duplicates will be collected at a frequency of one per 20 samples per sampling event (baseline, semiannual, etc.).
	Field blanks	Field blanks will be collected at a frequency of one per 20 samples or one per 4 sampling days whichever is more frequent. For less than 20 samples, one field blank will be collected. For 21-40 samples, two field blanks will collected.
	Trip blanks	Trip blanks will be collected when VOC samples are taken at a frequency of one per 20 samples per sampling event.
	Equipment rinsate	Equipment rinsate samples will be collected if the well does not have a dedicated pump. A minimum of one rinsate sample will be collected per 20 samples per sampling event.
	Performance evaluation sample (PES)	One PES will be collected per sampling event for each analyte except major ions during the sampling every 2.5 years. These will also be collected during one of the four baseline sampling events.

4.4 Corrective Measures

In the event a discrepancy is discovered by field personnel or auditors, some form of corrective measures will be initiated. The level of action taken is related to the level of the discrepancy. Corrective measures can range from field changes caused by unforeseen field conditions to DOE reportable incidents. Examples of corrective measures include resampling and/or reanalysis. Corrective action is described in Section 4.3.1 of the QAPjP (DOE-ID 2000a).

5. SAMPLING PROCEDURES AND EQUIPMENT

This section describes the sampling and monitoring procedures and equipment to be used for the planned groundwater monitoring. In accordance with the FFA/CO (DOE-ID 1991), the Agencies will be notified at least 14 days before a planned sampling event. Prior to commencing any sampling activities, a pre-job briefing will be held with all work-site personnel to review the requirements of the groundwater monitoring plan, the health and safety plan (HASP), and other work control documentation and to verify that all supporting documentation has been completed. After sampling, a post-job review will be conducted. All sampling will follow the current issues of technical procedures in *Environmental Monitoring Compliance Monitoring Handbook* (INEEL 2002). Water levels will be measured, wells purged, and samples collected as described below.

5.1 Water Level Measurement

Water levels will be measured in each monitoring well during each groundwater-sampling event prior to well purging. All groundwater elevations will be measured using either an electronic measuring tape (Solinst brand or equivalent) or a steel tape measure. Measurement of all groundwater levels will be recorded to an accuracy of 0.01 ft.

5.2 Decontamination of Equipment

Prior to sampling, all nondedicated sampling equipment that comes in contact with the water sample will be decontaminated. A temporary decontamination pad will be created for field cleaning of well-drilling and support equipment for WAG 3 drilling activities. The pad design, construction, and operation will allow decontamination of equipment plus an appropriate space to conduct decontamination activities. The pad will be designed to capture the rinsate generated and prevent release of contaminants, including overspray, to the environment. The material used for the impervious liner will be determined based on the need for pad durability and strength to accommodate the weight of the equipment to be decontaminated.

5.3 Well Purging

All wells will be purged prior to sample collection, and specific conductance, pH, and temperature will be measured.

5.3.1 Low Flow Purge for SRPA Wells

For SRPA wells, low-flow purging technology may be used. The following steps will be followed if low-flow purging technology is used:

- Determine a purge rate that will maintain a constant water level and not redevelop the well. This rate should be about 1 gal/min, more or less, depending on well diameter and height of the water column. Maintain and measure (using an in-line flow meter or bucket and stopwatch) a constant purge rate.

- Purge a minimum of two to three times the calculated volume of the pump and discharge line prior to sample collection. Using smaller-diameter purge lines will result in smaller purge volumes. This purge volume will be different for each well within the monitoring network due to the differing lengths of discharge tubing.

- Ensure that the water level in each well remains constant (no drawdown during purging and sampling).

- Monitor field parameters using an in-line flow-through cell for analytical data collection needs. It is not necessary to use the readings as indicator parameters for stabilization.

- Avoid disturbance of the water column during purging and sampling.

- After the required purge volume has been extracted for the well, reduce the purging rate and collect the groundwater samples.

- Containerize and dispose of the generated purge water as directed by the project's waste management plan (see Section 10).

5.3.2 Bailer Purge for Perched Water Wells

Bailers will be used for purging and sampling perched water wells. Because limited sample volumes are anticipated, parameters will not be required to stabilize before sampling. The well will either be purged dry or three well casing volumes will be purged, whichever occurs first. Purging will be considered complete, and samples will be collected. If insufficient water is available, the well will be allowed to recover for a minimum of 15 hours. If the volume is still insufficient, the samplers will collect the available water. Sampling at the well will be considered complete.

5.4 Snake River Plain Aquifer and Perched Water Sampling

Groundwater samples will be collected for the analyses defined in Section 4. The requirements for containers, preservation methods, sample volumes, holding times, and analytical methods will be specified in the analytical laboratory statement of work and are summarized in Tables 5-1 through 5-3. The sampling and analysis plan tables are provided in Appendix C.

Samples for VOC analysis require no headspace. All other bottles for groundwater samples will be filled to approximately 90 to 95% of capacity to allow for content expansion or preservation. Samples requiring acidification will be acidified to a pH < 2 using ultra-pure nitric acid or sulfuric acid.

Samples for metals analysis during baseline sampling will be both unfiltered and filtered using a 0.45-μm in-line filter. If insufficient water is available, only one unfiltered water sample will be collected. For perched water wells, water will be bailed from the well. To collect a filtered sample for metals analysis, a peristaltic pump will be used to pump the water through a 0.45-μm in-line filter directly into the sample bottle.

The following is the preferred order for measurements and sample collection when sample volume is limited (justifications are in parentheses):

1. Temperature, pH, and specific conductance during purging (routine, no extra volume required)

2. VOCs (limited sample volume required)

3. Radionuclides except I-129 (major COCs for ICDF Complex)

4. Metals, total chromium, mercury (chromium is an INEEL COC; mercury is the only metal that exceeds background in the design inventory)

Table 5-1. Baseline sampling analyte list, containers, and handling.

Matrix	Target Analyte List	Container: Size and Type	Container: Minimum Sample Quantity	Preservative	Holding Time
Water	Appendix IX VOCs	40 mL, GV	120 mL	Cool to 4°C, pH < 2 with H_2SO_4, no headspace	14 days
Water	Appendix IX SVOCs	1 L, A, G	1 L	Cool to 4°C	7 days
Water	Appendix IX metals	2 L, G or P	1800 mL	HNO_3 to pH < 2, filtered	180 days, except that mercury is 28 days
Water	Appendix IX metals	2 L, G or P	1800 mL	HNO_3 to pH<2, unfiltered	180 days, except that mercury is 28 days
Water	Calcium, potassium, magnesium, sodium	2 L, G or P	1500 mL	HNO_3 to pH < 2	180 days
Water	Nitrate, sulfate, bicarbonate (alkalinity)	1 L, G or P	800 mL	Cool to 4°C	28 days, except that alkalinity is 14 days
Water	Chloride	250 mL, G or P	150 mL	None required	28 days
Water	U-234, -235, and -238; Pu-238 and -239/240; and gamma spec	4 L, HDPE	4 L	HNO_3 to pH < 2	6 months
Water	Sr-90	500 mL, HDPE	500 mL	HNO_3 to pH < 2	6 months
Water	Tc-99	1 L, HDPE	1 L	HNO_3 to pH < 2	6 months
Water	I-129 and tritium	8500 mL, AG or HDPE	1100-8500 mL depending on detection limit	None required	6 months

A – amber
G – glass
HDPE – high-density polyethylene bottle
P – polyethylene
V – vial

Table 5-2. Semiannual sampling analytes, containers, and handling.

Matrix	Target Analyte List	Container: Size and Type	Container: Minimum Sample Quantity	Preservative	Holding Time
Water	Appendix IX VOCs	40 mL, GV	120 mL	Cool to 4°C, pH < 2 with H_2SO_4, no headspace	14 days
Water	Mercury and total chromium	1 L, G or P	900 mL	HNO_3 to pH < 2, filtered	180 days, except that mercury is 28 days
Water	Sr-90 and Tc-99	1500 mL, HDPE	1500 mL	HNO_3 to pH < 2	6 months

G – glass
HDPE – high-density polyethylene bottle
P – polyethylene
V – vial

Table 5-3. Two-and-a-half year sampling analytes, containers, and handling.

Matrix	Target Analyte List	Container: Size and Type	Container: Minimum Sample Quantity	Preservative	Holding Time
Water	Appendix IX VOCs	40 mL, GV	120 mL	Cool to 4°C, pH < 2 with H_2SO_4, no headspace	14 days
Water	Appendix IX SVOCs	1 L, A, G	1 L	Cool to 4°C	7 days
Water	Total chromium and mercury	1 L, G or P	900 mL	HNO_3 to pH < 2, filtered	180 days
Water	Calcium, potassium, magnesium, sodium	2 L, G or P	1500 mL	HNO_3 to pH < 2	28 days, except that alkalinity is 14 days
Water	Nitrate, sulfate, bicarbonate (alkalinity)	1 L, G or P	800 mL	Cool to 4°C	28 days
Water	Chloride	250 mL, G or P	150 mL	None required	6 months
Water	U-234, -235, -238 and Pu-238, -239/240	4 L, HDPE	4 L	HNO_3 to pH < 2	6 months
Water	Sr-90	500 mL, HDPE	500 mL	HNO_3 to pH < 2	6 months
Water	Tc-99	1 L, HDPE	1 L	HNO_3 to pH < 2	6 months
Water	I-129	8 L, AG or HDPE	1 L	None required	6 months

A – amber
G – glass
HDPE – high-density polyethylene bottle
P – polyethylene
V – vial

5. SVOCs (not expected in the leachate, but this will verify)

6. Major cations and anions (for fingerprinting)

7. I-129 (due to large sample volume needed).

Following sampling, all nondedicated equipment that came in contact with the well water will also be decontaminated prior to storage.

5.5 Sump Sampling

Simple grab samples will be collected from the leachate collection system sump and the tertiary leak detection sump. Dedicated pumps will be used for the collection of the samples.

As discussed above, there is the potential that the leachate collection system sump and/or the tertiary leak detection system sump may be dry during any sampling event. Field samplers will make a reasonable attempt to collect a sample and document the results.

5.6 Personal Protective Equipment

The personal protective equipment (PPE) required for drilling and baseline sampling is discussed in the project HASP for the *ICDF Complex Remedial Design/Construction Work Plan* (DOE-ID 2002a). PPE requirements for long-term monitoring will be in the project HASP for the ICDF Complex RAWP. Prior to disposal, all PPE will be characterized based on groundwater and field screening results, and a hazardous waste determination shall be made.

6. SAMPLING CONTROL

Strict sample control is required on this project. Sample control ensures that unique sample identifiers are used for separate samples. It also ensures that documentation of sample collection information is such that a sampling event may be reconstructed at a later date. The following sections detail unique sample designation, sample handling (including shipping), and radiological screening of samples.

6.1 Sample Identification Code

A systematic 10-character identification (ID) code will be used to uniquely identify all samples. Uniqueness is required to prevent the same ID code from being assigned to more than one sample.

When the first three characters of the code are ICD, this indicates that the sample originated from ICDF Complex monitoring activities. The next three numbers designate the sequential sample number for the project. The seventh and eighth characters represent a two-character set (e.g., 01, 02) for designation of field duplicate samples. The last two characters refer to a particular analysis and bottle type.

In this example, a groundwater sample collected in support of the ICDF Complex monitoring might be designated as ICD09001R8, where (from left to right):

- ICD designates the sample as being collected for the ICDF Complex groundwater monitoring
- 090 designates the sequential sample number
- 01 designates the type of sample (01 = original, 02 = field duplicate)
- R8 designates tritium analysis.

A sampling and analysis plan (SAP) table/database will be used to record all pertinent information (well designation, media, date, etc.) associated with each sample ID code.

6.2 Sample Designation

A SAP table format was developed to simplify the presentation of the sampling scheme for project personnel. The following sections describe the information presented in the SAP table/database.

6.2.1 Sample Description Fields

The sample description fields contain information related to individual sample characteristics.

6.2.1.1 Sampling Activity. The sampling activity field contains the first six characters of the assigned sample number. The sample number in its entirety will be used to link information from other sources (e.g., field data and analytical data) to the information in the SAP table for data reporting, sample tracking, and completeness reporting. The sample number will also be used by the analytical laboratory to track and report analytical results.

6.2.1.2 Sample Type. Data in this field will be selected from the following:

REG	for a regular sample
QC	for a quality control sample.

6.2.1.3 Matrix. Data in this field will be selected from the following:

GROUNDWATER	for water collected from the groundwater wells, perched water, and leachate
WATER	for other water samples (e.g., rinsates, field blanks, trip blanks).

6.2.1.4 Collection Type. Data in this field will be selected from the following:

GRAB	for grab
TBLK	for trip blanks
FBLK	for field blanks
RNST	for equipment rinsates
DUP	for duplicate samples.

6.2.1.5 Planned Date. This date, or event identifier, is related to the planned sample collection start date. In order to coincide with the spring thaw and rains, the semiannual sampling events are planned for June and December.

6.2.2 Sample Location Fields

This group of fields pinpoints the exact location for the sample in three-dimensional space, starting with the general AREA, narrowing the focus to an exact location geographically, and then specifying the DEPTH in the depth field.

6.2.2.1 Area. The AREA field identifies the general sample-collection area. This field should contain the standard identifier for the INEEL area being sampled. For this investigation, samples are being collected from INTEC; thus, the area identifier will be "ICDF."

6.2.2.2 Location. This field may contain geographical coordinates, x-y coordinates, building numbers, or other location-identifying details, as well as program-specific information such as a borehole or well number. Data in this field will normally be subordinated to the AREA. This information is included on the labels generated by the Sample Management Office (SMO) to aid sampling personnel.

6.2.2.3 Type of Location. The type of location field supplies descriptive information concerning the exact sample location. Information in this field may overlap that in the location field, but it is intended to add detail to the location. An example would be "groundwater well."

6.2.2.4 Depth. The DEPTH identified will correspond to the completion interval of the well measured in feet from land surface. For most of the wells, this will be determined once the wells are completed. For the leachate sump, it will be N/A.

6.2.3 Analysis Types (AT1-AT20)

These fields indicate analysis types (VOCs, Sr-90, etc.) and quantity requested. More information is provided at the bottom of the form to clearly identify each type.

6.3 Sample Handling

Analytical samples for laboratory analyses will be collected in pre-cleaned containers and packaged according to American Society for Testing and Materials or EPA-recommended procedures. The field QC samples will be included to satisfy the QA/QC requirements for the program as outlined in the quality assurance (QA) project plan (DOE-ID 2000a) and in Section 4. Qualified analytical laboratories (approved by the SMO) will analyze the samples.

6.3.1 Sample Preservation and Chain of Custody

Water samples will be preserved according to requirements listed in the QA project plan (DOE-ID 2000a) or equivalent. The chain-of-custody procedures will be followed per the QA project plan (DOE-ID 2000a) or equivalent. Sample containers will be stored in a secured area accessible only to the field team members.

6.3.2 Transportation of Samples

Samples will be shipped in accordance with the regulations issued by the U.S. Department of Transportation (DOT) (49 CFR 171 through 49 CFR 178) and EPA sample-handling, packaging, and shipping methods (40 CFR 262).

6.3.2.1 Custody Seals. Custody seals will be placed on all shipping containers in such a way as to ensure that tampering or unauthorized opening does not compromise sample integrity. Clear plastic tape will be placed over the seals to ensure that the seals are not damaged during shipment.

6.3.2.2 On-Site and Off-Site Shipping. An on-Site shipment is any transfer of material within the perimeter of the INEEL. Site-specific requirements for transporting samples within INEEL boundaries and those required by the shipping and receiving department will be followed. Shipment within the INEEL boundaries will conform to DOT requirements as stated in 49 CFR 171–178. Off-Site shipment will conform to all applicable DOT requirements.

6.4 Radiological Screening

If necessary, a gamma-screening sample will be collected and submitted to the Radiation Measurements Laboratory located at TRA-620 for a 20-minute analysis prior to shipment off-Site. If it is determined that the contact readings on the samples exceed 200 mr/hr beta/gamma, the samples will be held for analysis in the INTEC Remote Analytical Laboratory.

7. QUALITY ASSURANCE AND QUALITY CONTROL

A QA project plan has been developed for INEEL WAGs 1, 2, 3, 4, 5, 6, 7, 10 and inactive sites (DOE-ID 2000a). This plan pertains to all environmental, geotechnical, geophysical, and radiological testing, analysis, and data review. This section details the field elements of the QA project plan to support field operations during the groundwater sampling and monitoring.

7.1 Project Quality Objectives

The QA objectives specify the measurements that must be met to produce acceptable data for a project. The technical and statistical qualities of these measurements must be properly documented. Precision, accuracy, and completeness are quantitative parameters that must be specified for physical/chemical measurements. Comparability and representativeness are qualitative parameters.

The QA objectives for this project will be met through a combination of field and laboratory checks. Field QC checks will consist of collecting field duplicates, equipment blanks, and field blanks. Laboratory checks consist of initial and continuing calibration samples, laboratory control samples, matrix spikes, and matrix spike duplicates. Laboratory QA is detailed in the QA project plan (DOE-ID 2000a) and is beyond the scope of this groundwater monitoring plan.

7.1.1 Field Precision

Field precision is a measure of the variability not due to laboratory or analytical methods. The three types of field variability or heterogeneity are spatially within a data population, between individual samples, and within an individual sample. Although the heterogeneity between and within samples can be evaluated using duplicate samples, overall field precision will be calculated as the relative percent difference between two measurements or the relative standard deviation between three or more measurements. The relative percent difference or relative standard deviation will be calculated as indicated in the QA project plan (DOE-ID 2000a), for duplicate samples, during the data validation process. Precision goals have been established for inorganic Contract Laboratory Program methods by the EPA (EPA 1993) and for radiological analyses by the SMO. Duplicate samples to assess precision will be sampled, one immediately following the other, at a frequency of one duplicate for every 20 samples as shown in Table 4-5.

7.1.2 Field Accuracy

Sources of field inaccuracy are sampling preservation and handling, field contamination, and the sample matrix. The sampling locations and methods are designed to be representative or focused on specific objectives. Sampling accuracy may be assessed by evaluating the results of field, equipment rinsate, and/or trip blanks as described in Subsection 4.3.2.2 of the QA project plan (DOE-ID 2000a). During the sampling for VOCs, some portion of the volatile components may be lost. Although EPA-approved methods will be used to minimize the loss, there is no easy way to measure that loss.

During sample collection or shipping, contamination of the samples by sources other than the contamination under investigation would yield incorrect analytical results. To assess the occurrence of any possible contamination, field blanks, trip blanks for VOCs, and rinsates (if equipment that comes in contact with the samples is shared between wells) will be collected to evaluate any potential impacts. One goal of the sampling program is to eliminate any cross-contamination associated with sample collection or shipping.

Accuracy of field instrumentation will be maintained by calibrating all instruments used to collect data and cross-checking with other independently collected data.

7.1.3 Quality Assurance Project Plan Representativeness

Representativeness is evaluated by assessing the accuracy and precision of the sampling program and expressing the degree to which samples represent actual site conditions. In essence, representativeness is a qualitative parameter that addresses whether the sampling program was properly designed to meet the DQOs. The representativeness criterion is best satisfied by confirming that sampling locations are selected properly and a sufficient number of samples are collected to meet the requirements stated in the DQOs (see Section 3).

7.1.4 Comparability

Comparability is a qualitative measure of the confidence with which one data set can be compared to another. These data sets include data generated by different laboratories performing this work, data generated by laboratories in previous studies, data generated by the same laboratory over a period of several years, or data obtained using different sampling techniques or analytical protocols. For field aspects of this program, data comparability will be achieved using standard methods of sample collection and handling.

Data collection frequency and long-term trends will ensure comparability of monitoring data.

7.1.5 Completeness

Field completeness will be assessed by comparing the number of samples collected to the number of samples planned. Field sampling completeness is affected by such factors as equipment and instrument malfunctions and by insufficient sample recovery. Completeness can be assessed following data validation and reduction. The completeness goal for this project is 100% for critical activities.

During baseline sampling, obtaining samples from the SRPA wells is considered critical. During post-baseline sampling, the upgradient SRPA well is considered critical. Due to pump malfunctions, it may not always be possible to sample the SRPA wells. For any one sampling event, a completeness goal of 80% for the downgradient wells is acceptable. If a pump malfunctions, the field team leader (FTL) should contact the project manager so that the pump can be fixed prior to the next scheduled sampling round. On the next sampling round, any SRPA well that was not sampled on the previous round will be considered critical. Due to the potential for the perched water, leachate collection system, and, particularly, the tertiary leak detection system to be dry during any sampling event, these samples are considered to be noncritical, and no completeness goal is set. Collection of water level data and groundwater samples from the SRPA are considered critical activities under this groundwater monitoring plan.

7.2 Field Data Recording

The recording of field data is important to ensure that there have been no errors in sample labeling and documentation. This includes cross-referencing the SAP table with sample labels, logbooks, and chain-of-custody forms. Prior to sample shipment to the laboratory, field personnel will ensure that all field information is properly documented.

7.3 Data Validation

All laboratory-generated data will be validated to a minimum Level B with Tier 1 data packages requested, which allows data to be validated later to Level A if the need arises. Data validation will be performed in accordance with Guide Document (GDE) 7003, "Levels of Analytical Method Data Validation." Field-generated data (e.g., water levels and water temperature) will be validated through the use of properly calibrated instrumentation, by comparing and cross-checking data with independently gathered data, and by recording data-collection activities in a bound field logbook.

7.4 Quality Assurance Objectives for Measurement

The QA objectives are specifications that the monitoring and sampling measurements identified in the QA project plan must meet to produce acceptable data for the project. The technical and statistical quality of these measurements must be properly documented. Precision, accuracy, method detection limits, and completeness must be specified for chemical measurements. Specific QA objectives are included in DOE-ID (2000d).

8. DATA MANAGEMENT/DATA ANALYSIS AND UNUSUAL OCCURRENCES

Analytical data that result from groundwater sampling will be managed and maintained by the Integrated Environmental Data Management System (IEDMS). The Hydrogeologic Data Repository (HDR) will supply long-term management of the field data. This section discusses the approach to managing the data, analysis of data, and suggested responses to unusual occurrences.

8.1 Data Management

The following discussion presents the various processes associated with managing the data collected as part of this groundwater monitoring plan. Data management will follow guidelines specified in the following sections.

8.1.1 Laboratory Analytical Data

Analytical data are managed and maintained in the IEDMS. The components that make up the IEDMS provide an efficient and accurate means of sample and data tracking.

The IEDMS performs sample tracking throughout all phases of a sampling project, beginning with the assignment of unique sample ID numbers using the SAP Application Program. The SAP application produces a SAP table, which contains a list of sample ID numbers, sample demographics (area, location, and depth), and the planned analyses. Once the SAP application database is finalized, it is used to automatically produce sample labels and tags (with or without barcode identification). In addition, sampling guidance forms can be produced for the field sampling team and provide information such as sampling location, requested analysis, container types, and preservative.

When the analytical data package or sample delivery group (SDG) is received, it is logged into the IEDMS journaling system, an integrated subsystem of the sample tracking system, which tracks the SDG from data receipt to the Environmental Restoration Information System (ERIS). Cursory technical reviews on the data packages are performed to assess the completeness and technical compliance with respect to the project's analysis-specific "task order statement of work" or "statement of work." Any deficiencies, resubmittal actions, and special instructions are transmitted to the validator on the validation release form. This form is sent to the validator with the data package (when required).

Errors in the data package are resolved among the SMO chemist(s), the originating laboratory, and the IEDMS staff. Data validity is assured by the validator through the assignment of data validation flags. The validator generates a limitations and validation (L&V) report, which gives detailed information on the assignment of data qualifier flags. Copies of the Form 1s accompany the L&V report with the validator assigned data qualifier flags and any changes to the data results. The validated data results, along with the data qualifier flags, are entered into the IEDMS database. From this database, a summary table (i.e., result table) is generated. The result table summarizes the sample ID numbers, sample logistics, analytes, and results for each particular type of analysis (such as inorganic, radiological, organic) from the sampling effort. The field sample data from this database are also uploaded to ERIS.

8.1.2 Field Data

Field data include all data that are nonchemical analytical data generated in support of this groundwater monitoring program. These data will be managed according to the requirements specified in the *Data Management Plan for the INEL Environmental Restoration Program* (INEL 1995b). Final field data will reside in the HDR for long-term management. The HDR will maintain hard copies of the data reports along with electronic copies of the final field data.

8.2 Data Analysis

Analytical data will be validated and analyzed by the SMO following GDE 7003, "Levels of Analytical Method Data Validation," or equivalent. Field data will be analyzed using methods that are appropriate for the data types and specific field conditions. Some data sets may be filtered. Analysis will include recognized methods and techniques that are used with the specific data types and may include statistical processes.

8.3 Unusual Occurrences

Unusual occurrences are situations that are unforeseen, unanticipated, or unexpected. They may occur in chemical data sets or as field-related data and observations. An example of an unusual occurrence is detection of a COC where it was previously undetected.

The following is meant to provide a process for resolving an unusual occurrence rather than a method for dealing with each specific unusual occurrence. The following steps will be taken to resolve an unusual occurrence:

- Record the unusual occurrence and supporting observations in the field logbook.
- Validate the unusual occurrence (e.g., reanalyze the sample if any remains), and report to program manager as soon as possible.
- Determine if the occurrence is a one-time event or is recurring.
- If the unusual occurrence is of a significant nature (significant is anything that can potentially increase contaminant flux to the aquifer with concentration levels above MCLs, such as a large persistent increase in water levels), it will be reported to the appropriate program managers and EPA and IDEQ WAG managers.
- In the event that activities are creating an imminent or substantial endangerment to the health or welfare of workers or to the environment, work will stop immediately. In accordance with Section 29 of the FFA/CO, DOE will notify the EPA and IDEQ project managers within 24 hours and provide documentation no later than 10 working days after work stoppage.
- If the unusual occurrence is not of a significant nature (e.g., malfunctioning instrument that is reporting increases in water levels), it will be resolved by the technical leader and is a nonissue.
- For significant unusual occurrences, take appropriate action, which may include resampling, increasing sampling (in network, not just an individual well) and/or monitoring frequency, or reviewing the ROD for implementation of a corrective action.

9. PROJECT ORGANIZATION AND RESPONSIBILITIES

This section describes the organization, roles, and responsibilities for the ICDF Complex drilling and groundwater sampling activities.

9.1 ICDF Drilling

The following sections describe personnel responsibilities for the ICDF drilling activities. See Figure 9-1 for a drilling activities organization chart.

9.1.1 DOE-ID Project Manager

The DOE-ID project manager is the owner's representative and is responsible for project funding and implementing the responsibilities identified in the FFA/CO (DOE-ID 1991). The DOE-ID project manager will keep the regulatory Agencies informed of ICDF drilling activities and progress.

9.1.2 Regulatory Agencies

The roles and responsibilities of EPA and the IDEQ are defined in the FFA/CO (DOE 1991). The DOE-ID project manager will provide the Agencies with a 4-week schedule of field activities to be performed and will provide weekly updates via conference calls.

9.1.3 INTEC Site Area Director

The INTEC site area director has the authority and responsibility to ensure proper ownership review of all activities within the INTEC facility for all work processes and packages. The site area director's authority includes, but is not limited to, the following:

- Establishing and executing monthly, weekly, and daily operating plans
- Executing the INTEC Environmental, Safety, and Health (ES&H)/QA program
- Executing the Enhanced Work Planning for INTEC
- Executing the Voluntary Protection Program in the area
- Ensuring environmental compliance within the area
- Executing that portion of the voluntary compliance order that pertains to the area
- Correcting the root cause functions of the accident investigation in the area
- Correcting the root cause functions of the voluntary compliance order for the area.

The INTEC site area director is responsible for the overall operation of the INTEC facility. The WAG 3 project manager will keep the INTEC site area director informed of ICDF drilling activities from an upper-level management perspective.

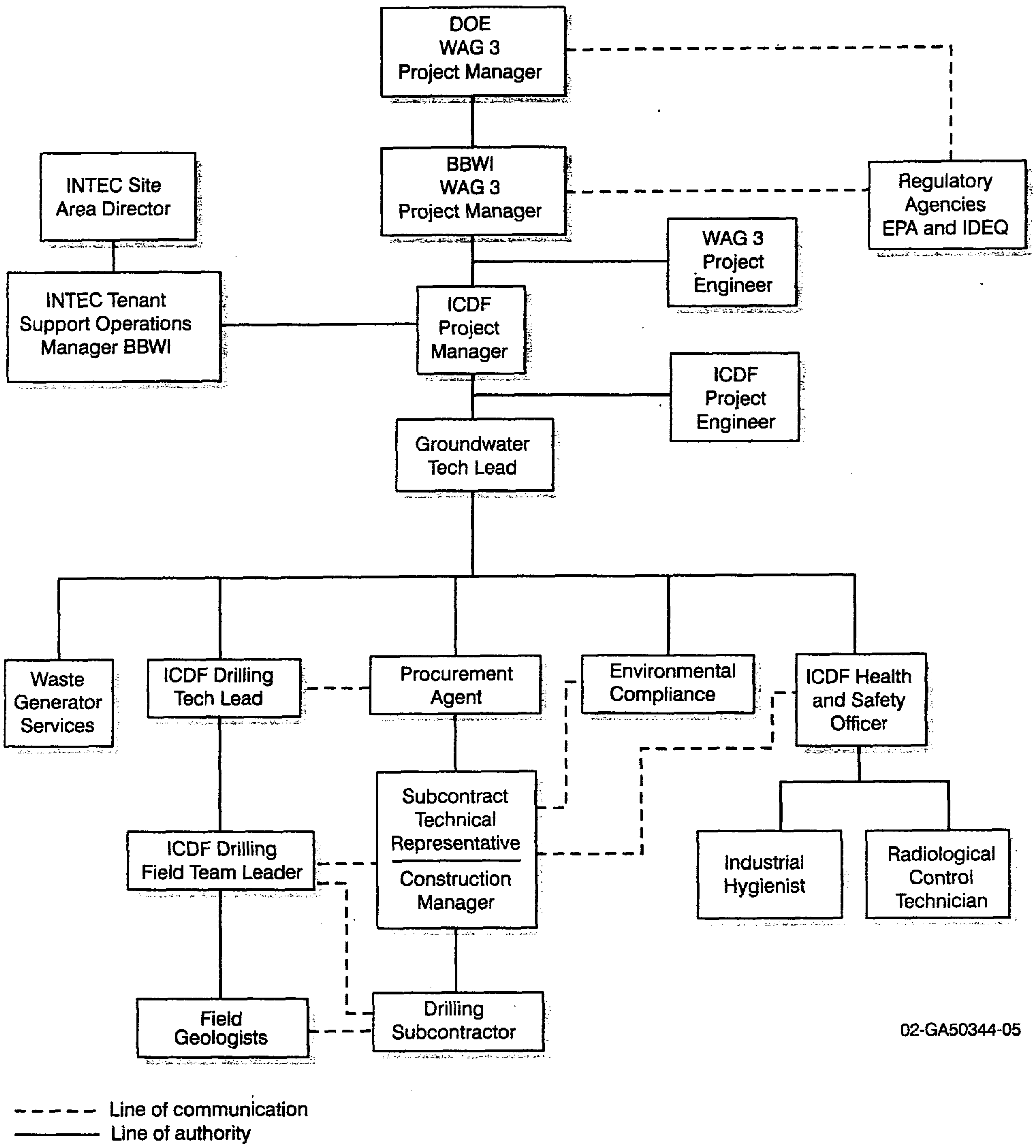

Figure 9-1. Drilling activities organization chart.

9.1.4 INTEC Tenant Support/Operations Manager

The INTEC tenant support/operations manager reports directly to the INTEC site area director. The ICDF project manager will interface with the INTEC tenant support/operations manager to ensure that ICDF drilling activities are integrated smoothly and safely with ongoing INTEC activities and vice versa.

9.1.5 WAG 3 Project Manager

The WAG 3 project manager is responsible for all WAG 3 activities that include the ICDF drilling and well construction. The WAG 3 project manager serves as the primary contact and coordinator for activities performed at WAG 3 for purposes of implementing the agreement and action plan and interfaces with the INTEC site area director.

9.1.6 WAG 3 Project Engineer

The WAG 3 project engineer is responsible for providing technical support to the WAG 3 project team. The WAG 3 project engineer is supported by the ICDF project engineer for reviewing and/or preparing technical documents related to engineering design and analyses. The WAG 3 project engineer reports to the WAG 3 project manager.

9.1.7 ICDF Project Manager

The ICDF project manager will have overall responsibility for the ICDF sample collection and interfaces with the INTEC tenant and support operations manager and the WAG 3 project engineer. The ICDF project manager will direct the activities of the ICDF project and field team staff, including the ICDF project engineer, the ICDF health and safety officer (HSO), and the environmental compliance officer.

9.1.8 ICDF Project Engineer

The ICDF project engineer is responsible for reviewing and/or preparing technical documents related to the ICDF design and construction. The ICDF project engineer reports to the ICDF project manager and supports the WAG 3 project engineer.

9.1.9 Procurement Agent

The procurement agent is responsible for all purchasing and contract-administration activities, including invoice disposition, coordination of interface document disposition, and issuing contract amendments. The procurement agent reports to the groundwater technical lead on groundwater-monitoring-related procurement activities and coordinates with the drilling technical lead and the subcontract technical representative/construction manager.

9.1.10 ICDF Groundwater Technical Lead

The groundwater technical lead provides technical expertise and oversees the preparation, review, and implementation of the groundwater monitoring plan to ensure work is technically correct. The groundwater technical lead works with the ICDF project manager to ensure that

- Site-specific plans, such as work plans and ES&H plans, required by the Environmental Restoration Program incorporate groundwater monitoring scope

- Activities and deliverables meet schedule and scope requirements, as described in the FFA/CO Attachment A, "Action Plan for Implementation of the Federal Facility Agreement and Consent Order," (DOE-ID 1991) and applicable guidance

- Issues related to support of QA and ES&H for the project are resolved.

The groundwater technical lead is responsible for technical decisions on well completions/construction and for coordinating with, and providing status to, the regulatory Agencies.

9.1.11 ICDF Drilling Technical Lead

The ICDF drilling technical lead is responsible for coordinating, mentoring, assigning, and overseeing the field geologists and field team leaders (FTLs) for the drilling projects. The drilling technical lead will prepare or oversee the preparation of the technical specifications and well designs to ensure they meet well construction standards and project objectives. The drilling technical lead will oversee drilling operations to ensure that the technical specifications are being implemented, and the drilling technical lead will work closely with the subcontractor and the construction management representative on the execution of the contract and preparation of the work control documents and procedures. The drilling technical lead will coordinate activities with the subcontractor drilling supervisor and with the USGS for geophysical logging services. Other responsibilities include preparing status reports, scheduling field resources, troubleshooting technical problems, and assisting in determining completion locations.

The drilling technical lead may function as the FTL at the job site.

9.1.12 Subcontract Technical Representative/Construction Manager

The subcontract technical representative (STR) oversees the ICDF drilling activities in the field and is the onsite representative for the ICDF project manager. The STR/construction manager (CM) is responsible for the preparation and implementation of the work control documents and will have overall responsibility for all construction activities associated with the ICDF drilling. The STR/CM will control the day-to-day construction tasks and will visit the site periodically to ensure work is progressing smoothly. The STR/CM is the point of contact for the drilling subcontractor and will review and approve or disapprove all invoices. Any changes to the scope will be documented with a change order and prepared by the STR/CM or designee.

STR/CM will also be the primary point of contact for the INTEC facility manager and will ensure all work is authorized each week through the facility plan of the day.

9.1.13 ICDF Field Team Leader

The FTL represents the Environmental Restoration organization at the job site with delegated responsibility for the safe and successful completion of the project. The FTL works with the drilling technical lead to manage drilling operations and to execute the scope of work. The FTL enforces work-site control, documents activities, and may conduct the daily safety briefings at the start of the shift. Health and safety issues must be brought to the attention of the FTL.

If the FTL leaves the job site, an alternate individual will be appointed to act as the FTL. Persons who act as the FTL on the job site must meet all the FTL training requirements, as outlined in the project HASP. The identity of the acting FTL will be conveyed to work-site personnel, recorded in the FTL logbook, and communicated to the INTEC director, or designee, when appropriate. The FTL is also responsible for conducting work shift turnovers.

The FTL will perform pre-job briefings and post-job reviews and submit the documentation to the INTEC site area director and the Environmental Restoration ES&H/QA manager.

The FTL will be responsible for ensuring compliance with waste management requirements and coordinating such activities with the environmental compliance coordinator and/or designee.

9.1.14 Field Geologist

The field geologist will be responsible for the proper identification and logging of all boreholes. In consultation with the FTL (and with the drilling technical lead and groundwater technical lead, when possible), the field geologist will recommend optimum completion locations and construction of the well based on information in the logbook and geophysical data. The field geologist will also oversee all well drilling and well construction and appropriately document all activities in the well drilling logbook.

9.1.15 Health and Safety Officer

The HSO is the person located at the work site who serves as the primary contact for health and safety issues. The HSO will assist the FTL on all aspects of health and safety (which includes complying with the Enhanced Work Planning process) and is authorized to stop work at the work site if any operation threatens worker or public health and/or safety. The HSO may be assigned other responsibilities, as stated the project HASP, as long those responsibilities do not interfere with the primary responsibilities stated here. The HSO is authorized to verify compliance to the actions, as appropriate. Other ES&H professionals at the work site (safety coordinator, industrial hygienist, radiological control technician, radiological engineer, environmental compliance coordinator, and facility representatives) may support the HSO, as necessary.

Persons assigned as the HSO, or alternate HSO, must be qualified (per Occupational Safety and Health Administration definition) to recognize and evaluate hazards. The HSO, or alternate, will be given the authority to take or direct actions to ensure that workers are protected. While the HSO may also be the industrial hygienist, or in some cases the FTL at the work site (depending on the hazards, complexity, and size of the activity involved and with concurrence from the Environmental Restoration ES&H/QA manager), other task-site responsibilities of the HSO must not conflict (philosophically or in terms of significant added volume of work) with the role of the HSO at the work site.

If it is necessary for the HSO to leave the work site, an alternate individual will be appointed by the HSO to fulfill this role. The identity of the acting HSO will be recorded in the FTL logbook, and work-site personnel will be notified.

9.1.16 Industrial Hygienist

The assigned industrial hygienist is the primary source for information regarding nonradiological hazardous and toxic agents at the task site. The industrial hygienist will assist the FTL in completing the job requirements checklist and will assess the potential of worker exposure to hazardous agents according to the contractor's safety and health manual, management control procedures, and accepted industrial hygienist practices and protocol. By participating in work-site characterization, the industrial hygienist assesses and recommends appropriate hazard controls for the protection of work-site personnel; operates and maintains airborne sampling and monitoring equipment; and reviews for effectiveness, recommends, and assesses the use of PPE required in the project HASP (recommending changes as appropriate).

In the event of an evacuation, the industrial hygienist, in conjunction with other recovery team members, will assist the FTL in determining whether conditions exist for safe work-site reentry, as described in the project HASP. Personnel showing health effects (signs and symptoms) resulting from possible exposure to hazardous agents will be referred to an Occupational Medical Program physician by the industrial hygienist, the personnel's supervision, or the HSO. The industrial hygienist may have other duties at the work site, as specified in the project HASP or in program requirements documents and/or management control procedures. During emergencies involving hazardous materials, airborne sampling and monitoring results will be coordinated with members of the Emergency Response Organization.

9.1.17 Radiological Control Technician

The assigned radiological control technician is the primary source for information and guidance on radiological hazards. The radiological control technician will be present at the job site during any work operations when personnel may be exposed to a radiological hazard. The radiological control technician will also assist the FTL in completing the job requirements checklist. Responsibilities of the radiological control technician include radiological surveying of the work site, equipment, and samples; providing guidance for radiological decontamination of equipment and personnel; and accompanying the affected personnel to the nearest INEEL medical facility for evaluation if significant radiological contamination occurs. The radiological control technician must notify the FTL of any radiological occurrence that must be reported as directed by the *INEEL Radiological Control Manual* (INEEL 2000a). The radiological control technician may have other duties at the job site, as specified in the project HASP, program requirements document, and/or management control procedures.

9.1.18 Waste Generator Services

Waste Generator Services personnel provide support to the project in the area of waste segregation, storage, and disposal. For this project, a Waste Generator Services engineer will be assigned to take care of all waste generated from the tasks conducted for this project

9.1.19 Environmental Compliance Coordinator

The assigned environmental compliance coordinator monitors and advises the project manager, technical lead, drilling technical lead, and FTL performing job-site activities on environmental issues and concerns by ensuring compliance with DOE orders, EPA regulations, and other regulations concerning the effect of work-site activities on the environment.

The environmental compliance coordinator provides support surveillance services for hazardous waste storage and transport and for surface water/storm water runoff control. The environmental compliance coordinator will assist the FTL in completing the job requirements checklist.

9.2 Groundwater Sampling

The following sections describe personnel responsibilities for ICDF groundwater sampling activities. See Figure 9-2 for a groundwater sampling activities organization chart.

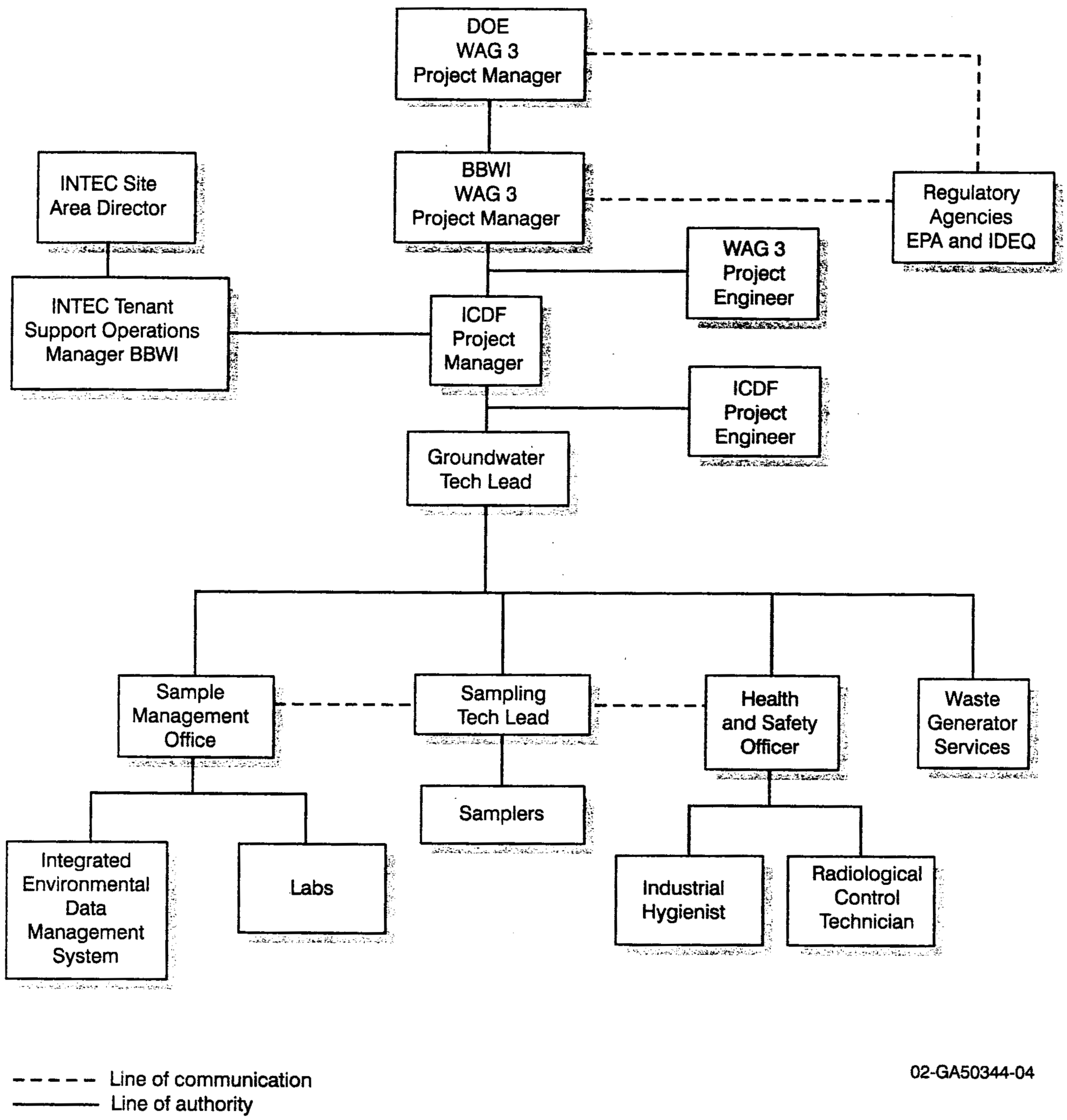

Figure 9-2. Groundwater sampling activities organization chart.

9.2.1 DOE-ID Project Manager

The DOE-ID project manager is the owner's representative and is responsible for project funding and implementing the responsibilities identified in the FFA/CO (DOE-ID 1991). The DOE-ID project manager will keep the regulatory Agencies informed of ICDF drilling activities and progress.

9.2.2 Regulatory Agencies

The roles and responsibilities of the EPA and the IDEQ are defined in the FFA/CO (DOE-ID 1991). The DOE-ID project manager will provide the Agencies with a 4-week schedule of field activities to be performed and will provide weekly updates via conference calls.

9.2.3 INTEC Site Area Director

The INTEC site area director has the authority and responsibility to ensure proper ownership review of all activities within the INTEC facility for all work processes and packages. The site area director's authority includes, but is not limited to, the following:

- Establishing and executing monthly, weekly, and daily operating plans
- Executing the INTEC ES&H/QA program
- Executing the Enhanced Work Planning for INTEC
- Executing the Voluntary Protection Program in the area
- Ensuring environmental compliance within the area
- Executing that portion of the voluntary compliance order that pertains to the area
- Correcting the root cause functions of the accident investigation in the area
- Correcting the root cause functions of the voluntary compliance order for the area.

The INTEC site area director is responsible for the overall operation of the INTEC facility. The WAG 3 project manager will keep the INTEC site area director informed of ICDF construction activities from an upper-level management perspective.

9.2.4 INTEC Tenant Support/Operations Manager

The INTEC tenant support/operations manager reports directly to the INTEC site area director. The ICDF project manager will interface with the INTEC tenant support/operations manager to ensure that ICDF sampling activities are integrated smoothly and safely with ongoing INTEC activities and vice versa.

9.2.5 WAG 3 Project Manager

The WAG 3 project manager is responsible for all WAG 3 activities, including collection of groundwater samples from wells at the ICDF. The WAG 3 project manager serves as the primary contact and coordinator for activities performed at WAG 3 for purposes of implementing the agreement and action plan and interfaces with the INTEC site area director.

9.2.6 WAG 3 Project Engineer

The WAG 3 project engineer is responsible for providing technical support to the WAG 3 project team. The WAG 3 project engineer is supported by the ICDF project engineer for reviewing and/or preparing technical documents related to engineering design and analyses. The WAG 3 project engineer reports to the WAG 3 project manager.

9.2.7 ICDF Project Manager

The ICDF project manager will have overall responsibility for the ICDF sample collection and will interface with the INTEC tenant support/operations manager and the WAG 3 project engineer. The ICDF project manager will direct the activities of the ICDF project and field team staff, including the ICDF project engineer, the ICDF HSO, and the sample crew. Additionally, the ICDF project manager functions as the point of contact for the ICDF design and construction subcontractor. Functionally, the ICDF project manager reviews and approves QA reports submitted by the ICDF construction QA certifying officer.

9.2.8 ICDF Project Engineer

The ICDF project engineer is responsible for reviewing and/or preparing technical documents related to ICDF design, construction, and sample collection. The ICDF project engineer reports to the ICDF project manager and supports the WAG 3 project engineer.

9.2.9 ICDF Groundwater Technical Lead

The groundwater technical lead provides technical expertise and oversees the preparation, review, and implementation of the groundwater monitoring plan to ensure work is technically correct. The groundwater technical lead works with the project manager to ensure that

- Site-specific plans, such as the groundwater monitoring plan and ES&H plans, required by the Environmental Restoration Program incorporate groundwater monitoring scope

- Activities and deliverables meet schedule and scope requirements as described in the FFA/CO Attachment A, "Action Plan for Implementation of the Federal Facility Agreement and Consent Order," (DOE-ID 1991) and applicable guidance

- Issues related to support of QA and ES&H for the project are resolved.

The groundwater technical lead will interface with the sampling technical lead and is responsible for coordinating with, and providing status to, the regulatory Agencies.

9.2.10 Sampling Technical Lead

The sampling technical lead is responsible for coordinating and overseeing the sampling at the ICDF Complex. The sampling technical lead is responsible for ensuring that all samples are properly packaged and shipped to the appropriate laboratory and that all chain-of-custody forms are properly completed and recorded. The sampling technical lead is also responsible for coordinating with necessary field personnel such as Waste Generator Services and Radiation Control personnel.

9.2.11 Samplers

The sampling team will perform the onsite tasks necessary to collect, package, and ship samples. Tasks may include the physical collection of sample material, completion of chain-of-custody and shipping request forms, and proper packaging of samples in accepted shipping containers (property labels and sealed coolers). The size and makeup of the sampling team will depend on the extent of the sampling task. The industrial hygienist and radiological control technician will support the sampling team when sampling is performed in contaminated wells when deemed necessary by the industrial hygienist or the radiological control technician. The sampling team will be lead by the designated sample technical lead.

9.2.12 Health and Safety Officer

The HSO will be located at the work site and serves as the primary contact for health and safety issues. The HSO will assist the sampling technical lead on all aspects of health and safety (which includes complying with the Enhanced Work Planning process) and is authorized to stop work at the work site if any operation threatens worker or public health and/or safety. The HSO may be assigned other responsibilities, as stated in other sections of the project HASP, as long as those responsibilities do not interfere with the primary responsibilities stated here. The HSO is authorized to verify compliance to the actions, as appropriate. Other ES&H professionals at the work site (industrial hygienist, radiological control technician, radiological engineer, environmental compliance coordinator, and facility representatives) may support the HSO, as necessary.

Persons assigned as the HSO, or alternate HSO, must be qualified (per Occupation Safety and Health Administration definition) to recognize and evaluate hazards and will be given the authority to take or direct actions to ensure that workers are protected. While the HSO may also be the industrial hygienist at the work site (depending on the hazards, complexity, and size of the activity involved and with concurrence from the Environmental Restoration ES&H/QA manager), other task-site responsibilities of the HSO must not conflict (philosophically or in terms of significant added volume of work) with the role of the HSO at the work site.

If it is necessary for the HSO to leave the work site, an alternate individual will be appointed by the HSO to fulfill this role. The identity of the acting HSO will be recorded in the FTL logbook, and work-site personnel will be notified.

9.2.13 Industrial Hygienist

The assigned industrial hygienist is the primary source for information regarding nonradiological hazardous and toxic agents at the task site. The industrial hygienist will assess the potential of worker exposure to hazardous agents according to the contractor's safety and health manual, management control procedures, and accepted industrial hygienist practices and protocol. By participating in work-site characterization, the industrial hygienist assesses and recommends appropriate hazard controls for the protection of work-site personnel; operates and maintains airborne sampling and monitoring equipment; and reviews for effectiveness, recommends, and assesses the use of PPE required in the project HASP (recommending changes as appropriate).

In the event of an evacuation, the industrial hygienist, in conjunction with other recovery team members, will assist in determining whether conditions exist for safe work-site reentry, as described in the project HASP. Personnel showing health effects (signs and symptoms) resulting from possible exposure to hazardous agents will be referred to an Occupational Medical Program physician by the industrial hygienist, the personnel's supervision, or the HSO. The industrial hygienist may have other duties at the work site, as specified in the project HASP, in the program requirements documents, and/or management control procedures. During emergencies involving hazardous materials, airborne sampling and monitoring results will be coordinated with members of the Emergency Response Organization.

9.2.14 Radiological Control Technician

The assigned radiological control technician is the primary source for information and guidance on radiological hazards. The radiological control technician will be present at the job site during any work operations when personnel may be exposed to a radiological hazard. Responsibilities of the radiological control technician include radiological surveying of the work site, equipment, and samples; providing guidance for radiological decontamination of equipment and personnel; and accompanying the affected personnel to the nearest INEEL medical facility for evaluation if significant radiological contamination occurs. The radiological control technician will notify the FTL of any radiological occurrence that must be reported as directed by the *INEEL Radiological Control Manual* (INEEL 2000a). The radiological control technician may have other duties at the job site, as specified in the project HASP, the program requirements document, and/or management control procedures.

9.2.15 Sample Management Office

The INEEL SMO has the responsibility of obtaining necessary laboratory services required to meet the needs of this project. SMO personnel will also ensure that data generated from samples meet the needs of the project by validating all analytical laboratory data to resident protocol and ensuring that data are reported to the project in a timely fashion, as required by the FFA/CO (DOE-ID 1991).

The laboratory contracted by the SMO will have overall responsibility for quality of the laboratory quality, control of laboratory costs, management of laboratory personnel, and adherence to agreed-upon laboratory schedules. Responsibilities of the laboratory personnel include preparing analytical reports, ensuring COC information is complete, and ensuring all QA/QC procedures are implemented in accordance with SMO task order statements of work and master task agreements.

9.2.16 Waste Generator Services

Waste Generator Services personnel provide support to the project in the area of waste segregation, storage, and disposal. For this project, a Waste Generator Services engineer will be assigned to take care of all waste generated from the tasks conducted for this project

9.2.17 Environmental Compliance Coordinator

The assigned environmental compliance coordinator monitors and advises the project manager, the technical lead, and the FTL performing job-site activities on environmental issues and concerns by ensuring compliance with DOE orders, EPA regulations, and other regulations concerning the effect of work-site activities on the environment.

The environmental compliance coordinator provides support surveillance services for hazardous waste storage and transport and for surface water/storm water runoff control. The environmental compliance coordinator will assist the FTL in completing the job requirements checklist.

9.2.18 Integrated Environmental Data Management System

The IEDMS technical leader will interface with the project manager during the preparation of the SAP database. This individual also provides guidance on the appropriate number of field QC samples required by the QA project plan (DOE-ID 2000a). The numbers used by the project are unique from all others assigned by IEDMS. The preparation of the plan database, along with completion of the SMO request services form, initiates the sample and sample waste tracking activities performed by the SMO.

10. WASTE MANAGEMENT

Remediation-derived waste generated during the drilling, well installation and development, and baseline sampling will be managed in accordance with the *INEEL CERCLA Disposal Facility Construction Waste Management Plan* (DOE-ID 2002b), which is in the *INEEL CERCLA Disposal Facility Remedial Design/Construction Work Plan* (DOE-ID 2002a). Wastes from post-baseline sampling will be managed in accordance with the *DOE-ID ICDF Complex Operations Waste Management Plan* (currently in preparation), which will be in the final ICDF Complex RAWP (currently in preparation).

11. HEALTH AND SAFETY

Work performed for the ICDF Complex drilling activities and the baseline sampling will be performed in accordance with the *Health and Safety Plan for Construction of the INEEL CERCLA Disposal Facility and Evaporation Pond* (INEEL 2000b) in the *ICDF Final Remedial Design/Construction Work Plan* (DOE-ID 2002a). Work performed for the long-term groundwater monitoring will be performed in accordance with the "Health and Safety Plan for INEEL CERCLA Disposal Facility Operations" (INEEL 2001) in the ICDF Complex RAWP.

Before commencing field work, the FTL will contact the ICDF HSO and obtain a copy of the names of the current project points of contact and emergency notification names, phone numbers, and pagers. A current list will be maintained in the field.

12. DOCUMENT MANAGEMENT

Subsection 12.1 summarizes document management and sample control. Documentation includes field logbooks used to record field data and sampling procedures, chain-of-custody forms, and sample container labels. The analytical results from this field investigation will be documented in reports.

12.1 Documentation

The FTL will be responsible for controlling and maintaining all field documents and records and for verifying that all required documents to be submitted to the INEEL SMO are maintained in good condition. All entries will be made in indelible black ink. Errors will be corrected by drawing a single line through the error and entering the correct information. All corrections will be initialed and dated.

12.1.1 Sample Container Labels

Waterproof, gummed labels generated from the SAP database will display information such as the unique sample ID number, the name of the project, sample location, and analysis type. Labels will be completed and placed on the containers in the field before collecting the sample. Sample team members will provide information necessary for label completion. Such information may include sample date, time, preservative used, field measurements of hazards, and the sampler's initials.

12.1.2 Field Guidance Form

Field guidance forms, provided for each sample location, will be generated from the SAP database to ensure unique sample numbers. These forms are used to facilitate sample container documentation and organization of field activities. The forms contain information regarding the following:

- Media
- Sample ID numbers
- Sample location
- Aliquot ID
- Analysis type
- Container size and type
- Sample preservation.

12.1.3 Field Logbooks

In accordance with INEEL SMO format, field logbooks will be used to record information necessary to interpret the analytical data. All field logbooks will be controlled and managed according to company procedures.

12.1.3.1 Sample/Shipping Logbook. Sample logbooks will be used by the field teams. Each sample logbook will contain information such as

- Physical measurements (if applicable)
- All QC samples
- Shipping information (e.g., collection dates, shipping dates, cooler ID number, destination, chain-of-custody number, name of shipper)
- All team activities
- Problems encountered
- Visitor log
- List of site contacts.

This logbook will be signed and dated at the end of each day's sampling activities.

12.1.3.2 Field instruments Calibration/Standardization Logbook. A logbook containing records of calibration data will be maintained for each piece of equipment requiring periodic calibration or standardization. This logbook will contain log sheets to record the date, time, method of calibration, and instrument ID number.

12.1.3.3 Field Team Leader's Daily Logbook. A project logbook maintained by the FTL will contain a daily summary of the following:

- All field team activities
- Visitor log
- List of site contacts
- Problems encountered
- Any corrective actions taken as a result of field audits.

This logbook will be signed and dated at the end of each day's sampling activities.

13. REPORTING

Documentation of the quality assured data or results of the monitoring program will be submitted to the Agencies as the data become available but no later than 120 days after collection. The first monitoring report will document the baseline sampling results.

14. REFERENCES

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